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Positive Externalities of Energy Efficiency: A Reason for Public Sector Engagement



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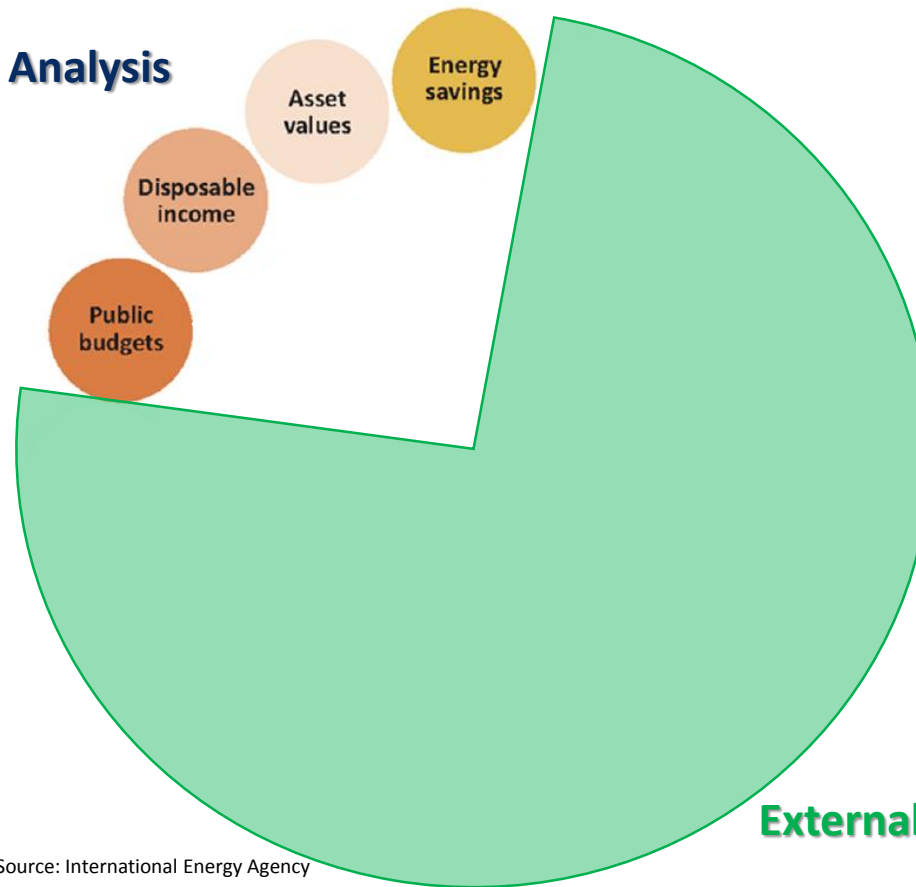
Mariano Gonzalez

Prologue

- EE has demonstrated to be best fuel alternative in countries with limited access to energy resources and high cost of energy
- The private sector usually require incentives, special regulations and support measures from the public sector to develop EE operations
- Even if EE brings several benefits to the society, markets are inefficient to capture this value
- **Externality** is the cost or benefit that affects a party who did not choose to incur that cost or benefit
- Overall cost and benefit to society is defined as the sum of the imputed monetary value of benefits and costs to all parties involved. Thus, **unregulated markets** in goods or services **with significant externalities generate prices that do not reflect the full social cost or benefit** of their transactions; such markets are therefore **inefficient**. This is the case of EE

Energy Efficiency Benefits: Revenues and externalities

Revenues: Financial Analysis



Source: International Energy Agency

Society:

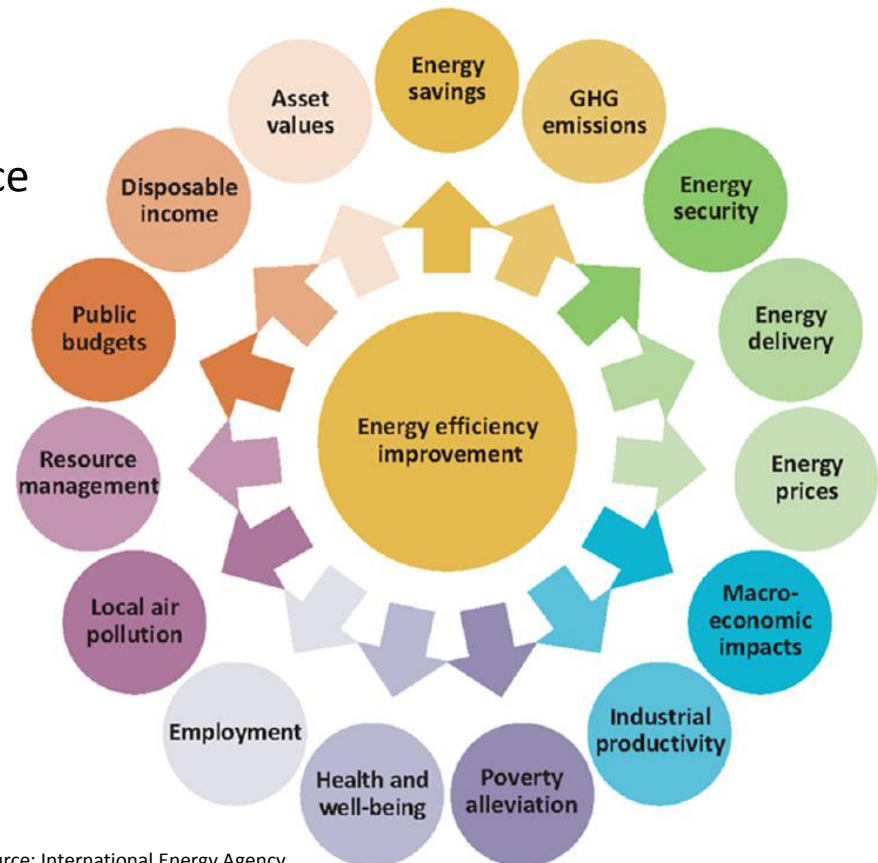
$$Cashflow = -Investment + \sum_{k=0}^n Energy Savings_k * Energy Price_k$$

Energy Efficiency: five challenges for an efficient EE market

1. Identification of benefits
2. Capturing externalities
3. Redistribution of EE benefits
4. Making visible the hidden benefits
5. Bridging the investment-return gap: Incentives and financing

Other externalities:

- Environmental and Economic Resilience
- Foreign currency reserves
- Balance of payments
- Cost of Infrastructure (fix cost)
- “Indigenous” resource



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Methodologies:

- Direct measurement: Energy cost reduction and best alternative
- Analysis via proxys: health system savings
- Artificial market: Green certificates
- Immeasurable benefits: social well-being

Relevance:

- The resources to be mobilized to incentivize EE activities should be commensurate to the value of the externalities produced
- Crucial for targeting and prioritizing high impact EE activities

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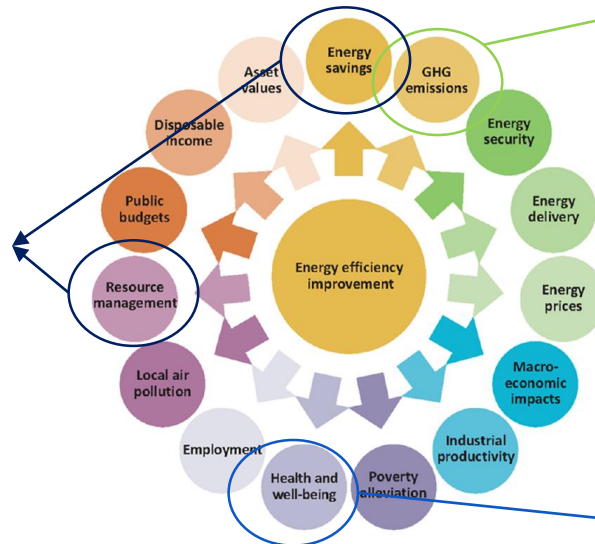
Over past 25 years, ten billion tonnes CO₂ emissions saved.



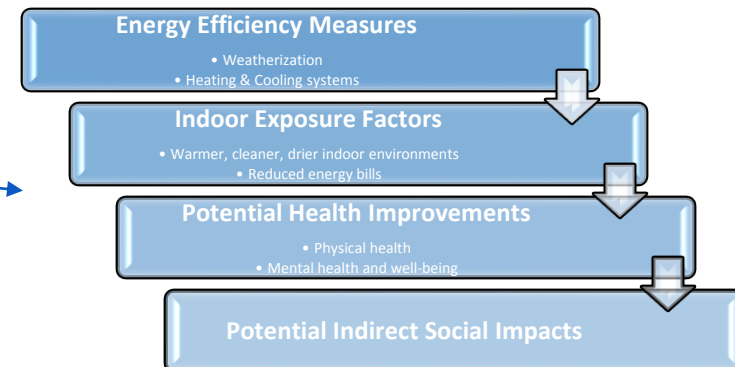
According to IEA estimates,



- Over past 25 years, a cumulative USD 5.7 trillion saved in energy expenditures.
- IEA countries saved \$80bn in fossil fuel imports in 2014; just Germany avoided \$30bn in energy imports last year.



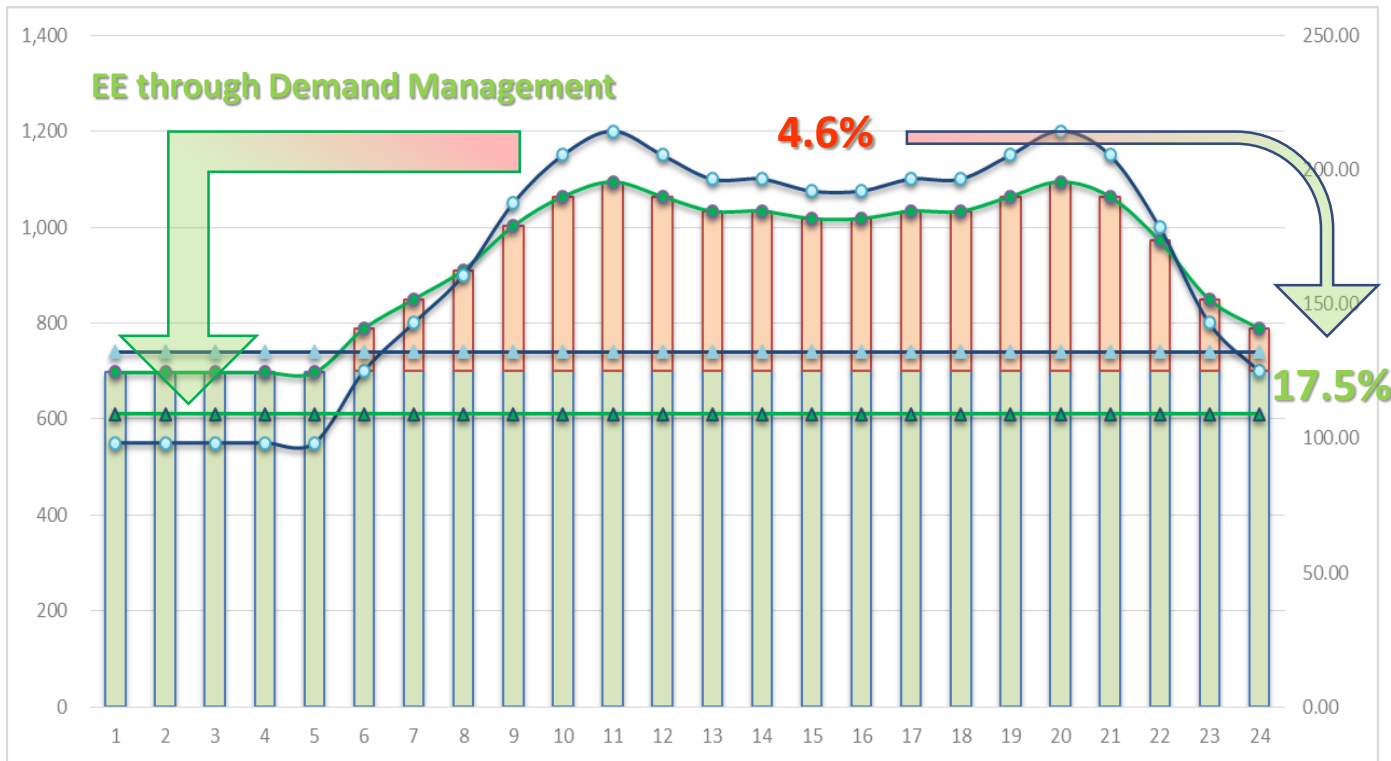
Carefully executed energy efficiency can deliver USD 99 billion in annual savings for Europe's public health sector by 2020



Source: International Energy Agency

Energy Efficiency: five challenges for an efficient EE market

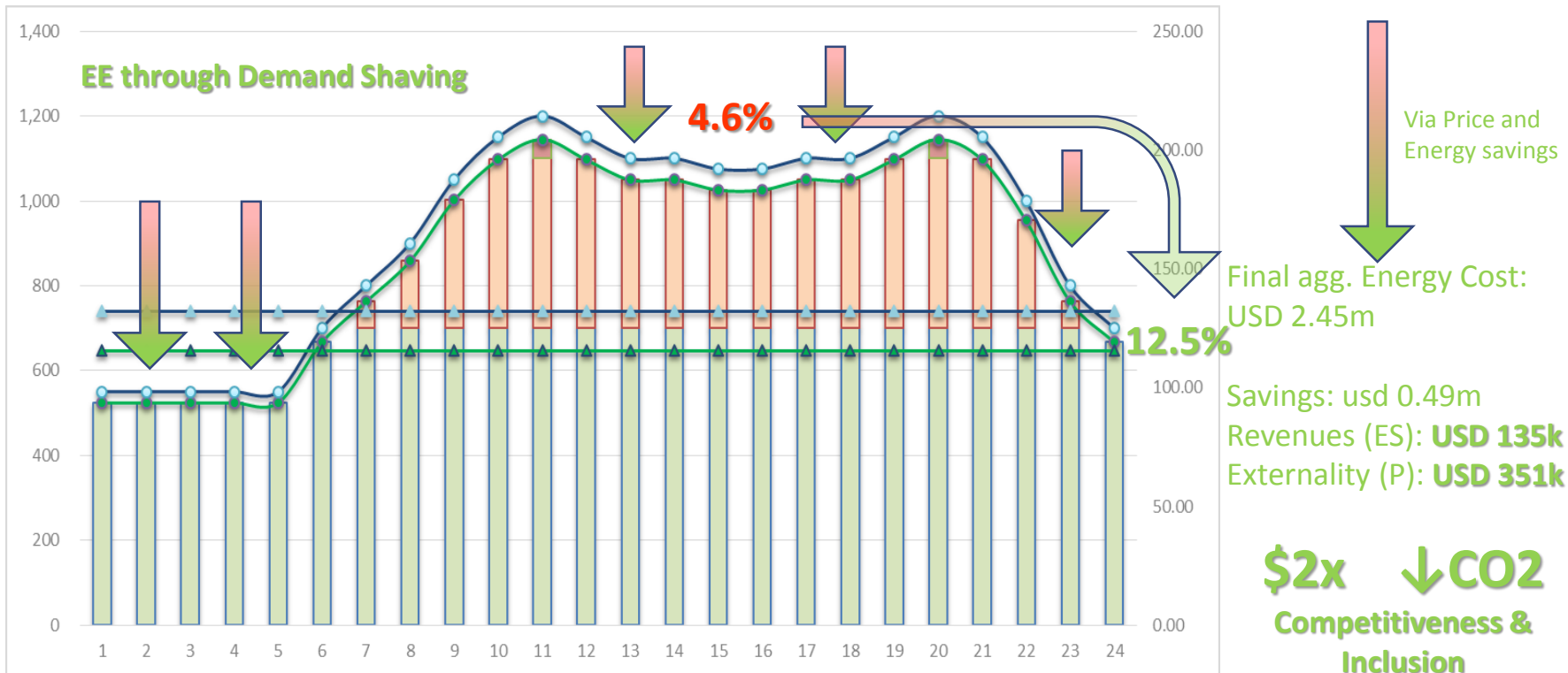
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\$20x **↓ CO2**
Competitiveness & Inclusion

Energy Efficiency: five challenges for an efficient EE market

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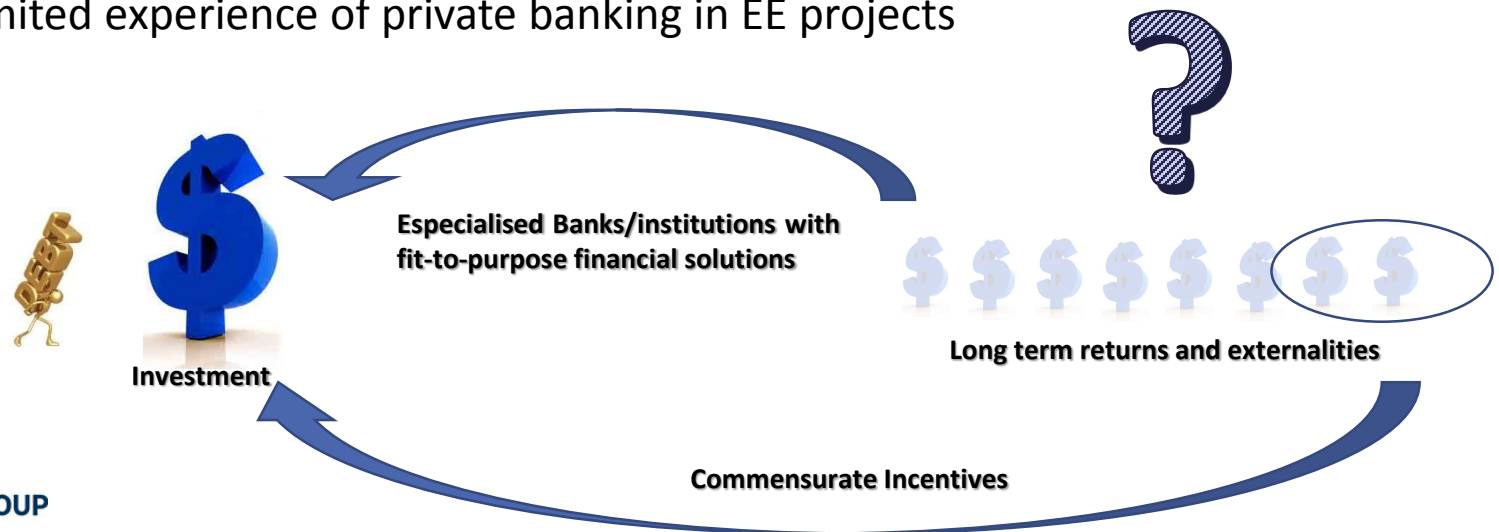
Energy Efficiency: five challenges for an efficient EE market

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- 4. Making visible the hidden benefits**
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The understanding of some externalities require espezialized technical background and in-depth analysis. For universal visibility of these externalities, alternate systems may be used for this purpose (Labelling and certification, communication campaigns, capacity building in SMEs and Banking sector)

Energy Efficiency: five challenges for an efficient EE market

1. Identification of benefits
2. Capturing externalities
3. Redistribution of EE benefits
4. Making visible the hidden benefits
5. **Bridging the investment-return gap: Incentives and financing**
 - Uncertainty: difficulty to forecast future returns and risk to capture them
 - Indebtedness and budgetary limitations incentivize lower front payment options
 - Limited experience of private banking in EE projects



Energy Efficiency tools to tap into externalities

Policy and Institutional Arrangements

- Overarching legal framework (EE Law)
- NEEAP, progress reports
- Secondary legislation
- National EE institutions
- Building codes, performance certificates
- Building material/appliance standards
- Public procurement
- Appliance labeling
- HOA legislation

Public awareness and communication

- Labelling: buildings, , stand-by, appliances
- Consumer awareness campaigns
- Education programmes
- Pilots and demonstration projects

Market Conditions...

- District heating coverage, metering
- Bill collections (power & heat)
- Market assessments
- Building stock, energy database
- ESCO market
- Municipal, HOA creditworthiness
- Commercial bank lending for EE

... and regulation

- Cost-reflective pricing (power & heat)
- Energy management and auditing
- ESCO regulations
- Public EE policies and regulations
- Utility programs

Successful EE Programs

Capacity Building

- EE institution strengthening
- Energy auditor/manager training
- Private sector training programs (banks, ESCOs/EE service providers, M&V providers)
- Energy management systems
- Information centers
- Publications, case studies
- Especialized education

Finance & Implementation

- Incentive schemes (public & private)
- Revolving EE fund
- Public sector investment programs
- Commercial credit lines (commercial & residential)
- Sustained financing schemes
- Commercial ESCO financing
- Energy audit support

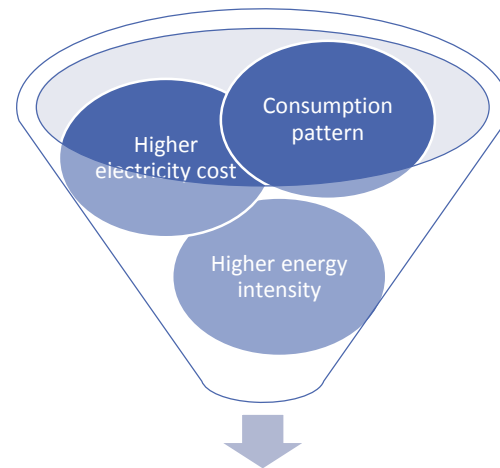
Main stakeholders in the Energy Efficiency sector



- Public sector: Ministries, Institutions, municipalities, Utilities
- Private sector: Utilities, ESCOs, consulting firms, auditing companies
- End-consumers: industrial, commercial and residential
- Financial Services: Private/Public Banks, Trust Funds, MDBs

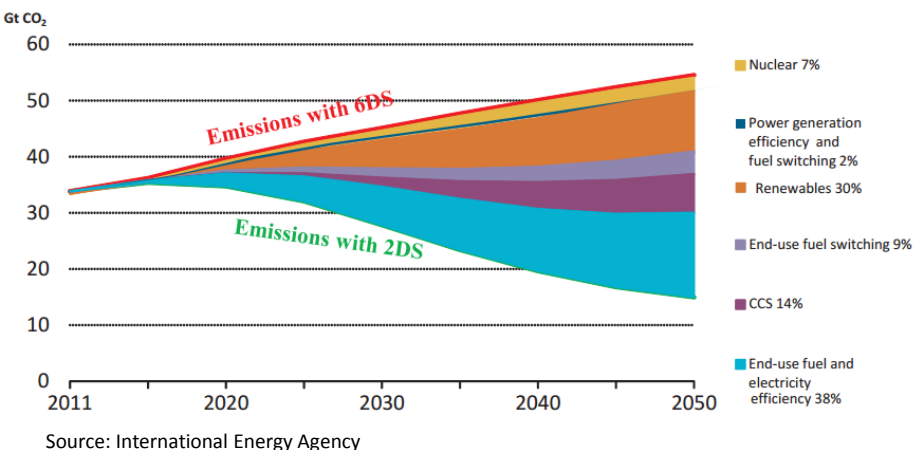
EE Solutions must be customized to

- Consumption patterns
- Energy markets
- Energy cost
- Climate features
- Cultural behaviours
- Implementation capacity
- Market arrangements and stakeholders

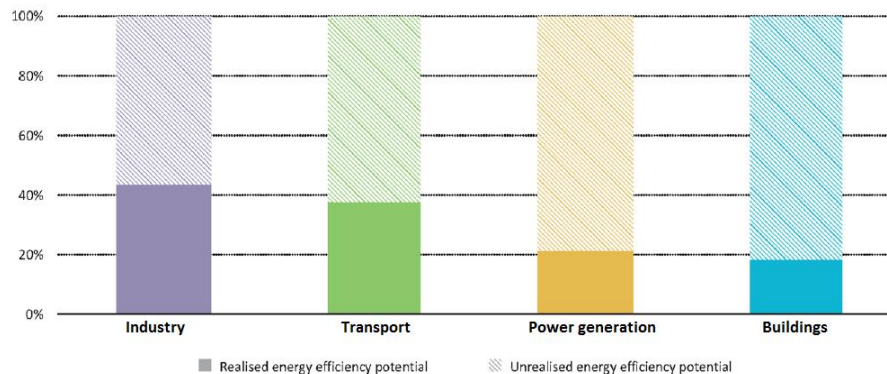


Customized Solutions

Energy Efficiency Prospects



Circa 40% of the worldwide CO2 emission reduction to achieve the IEA 2DS scenario will come from EE and 30% from RE, according to IEA estimations



Two-thirds of the economic potential to improve energy efficiency remains untapped in the period to 2035 unless policy activity increases
The energy sector will evolve dramatically

Kiev, Ukraine: retrofits to public buildings in the mid-2000s resulted in a 26 percent reduction in heat consumption, as well as more comfortable buildings.

China could reduce the energy consumption in buildings by an estimated 22%, through enhancement of current building codes,.

India: new large commercial buildings can achieve nearly 40 percent energy savings cost-effectively, compared with existing national benchmark buildings

The World Bank and Energy Efficiency

Market Conditions

Municipal Energy Efficiency in Buildings in ECA: Energy savings typically 30-45% per building, with a payback periods ~6-8 years. Substantial co-benefits (improved comfort, urban renewal, public awareness, student education)

The “EDGE” Green Building Market Transformation Program: has a goal of 20 percent of all new construction in target markets being certified as “green” -- that is, with measurable increases in resource efficiency.

EE on Water Utilities report: that demonstrated that, by introducing a few relatively simple energy efficiency measures, the water utilities could substantially reduce costs and water losses, realize energy savings of up to 30%, and increase access to water for poor communities.

Capacity Building

The City Energy Efficiency Transformation Initiative, and Low-Carbon, Livable Cities: training city officials on integrating energy efficiency and climate considerations in urban planning and investment programs, conducting city-wide assessments, etc.

The City Energy Efficiency Transformation Initiative (CEETI) - Energy efficiency integration in city planning, management and operations. It provides technical assistance designed to help take energy efficiency to the next level, including hands-on training for city officials so that they can assess opportunities, integrate energy efficiency into their planning.

Finance & Implementation

Mexico Municipal Energy Efficiency Project (US\$ 200m) - Support of large-scale demonstration EE investments in the municipal service sector and in public buildings, and building national and local capacity.

Public lighting In Rio de Janeiro; assessment which showed that a US\$ 190m investment in switching public lighting over to LEDs would save the city US\$ 380m in operating costs, and reduce energy consumption in the sector by 57%.

Policy

Green Building Code Colombia: (a) creation of a legal national framework to promote EE, rational water usage and environmental friendly systems (b) capacity building. (IFC)

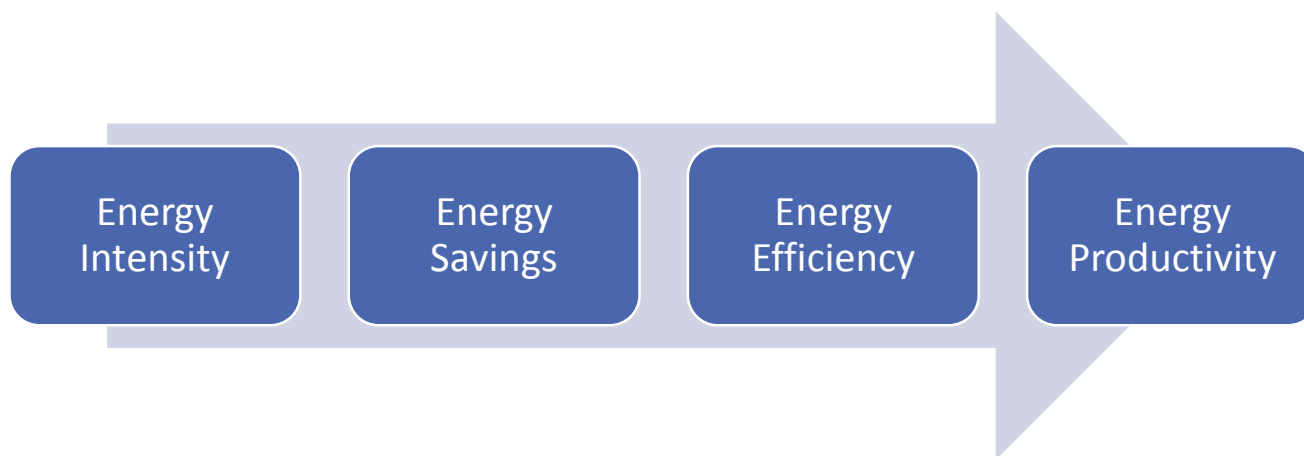
Regulation

Tool for Rapid Assessment of City Energy, or TRACE - Allows city planners to quickly identify potential energy efficiency improvements, target sectors that are underperforming, and prioritize interventions. Deployed in 27 cities in Africa, Asia, Eastern Europe and Latin America.

Epilogue

Public sector engagement required to regulate EE due to market inefficiency to capture externalities, through different actions:

- Analysing the market, its externalities, barriers and inefficiencies
- Making visible lagged in time or hidden benefits
- Quantifying externalities to decide
- Designing customized and targeted operations, no off-shelf activities
- Define incentive schemes simple and commensurate to the externalities intended to be captured, by transforming externalities into revenues
- Create sound legal framework for EE and safe environments for ESCOS to develop
- Enable the access to adequate financial resources and solutions





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Thank you
Muchas gracias

Energy and Extractives Global Practice

World Bank Group
1850 I st. NW
Washington, DC

